



Notes on some species of *Allactoneura* De Meijere (Diptera: Mycetophilidae: Leiinae)

Dimitar N. Bechev¹, Svetlozara B. Kazandzhieva^{2,3}

(1) Department of Zoology, University of Plovdiv, Tzar Assen 24, 4000 Plovdiv, Bulgaria, dbechev@gmail.com ; <https://orcid.org/0000-0001-5697-1197> 

(2) [Corresponding author] National Museum of Natural History, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd, 1000 Sofia, Bulgaria

(3) Regional Museum of Natural History – Plovdiv, 34 Hristo G. Danov Street, 4000 Plovdiv, Bulgaria, svetlozara.k@gmail.com ; <https://orcid.org/0000-0001-5018-8951> 

Abstract: The fungus gnat genus *Allactoneura* is basically Afro-Oriental in distribution, extending into the eastern Palaearctic, New Guinea and northern Australia. New data on the distribution of *Allactoneura argentosquamosa*, *A. akasakana*, *A. cincta* and *A. formosana* are presented. *A. akasakana* is discussed as probable synonym of *A. argentosquamosa*.

Keywords: *Allactoneura*, China, distribution, Japan, Oriental Region

Introduction

Allactoneura De Meijere (type species *A. cincta* De Meijere, 1907) is a small genus currently comprising nine described extant species: *A. akasakana* Sasakawa, 2005, *A. argentosquamosa* (Enderlein, 1910), *A. cincta* De Meijere, 1907, *A. formosana* Enderlein, 1910, *A. neocaledonica* Matile, 1993, *A. nigrofemorata* De Meijere, 1913, *A. obscurata* (Walker, 1865), *A. papuensis* Bechev, 1995 and *A. ussuriensis* Zaitsev, 1981. The species *A. formosana* and *A. nigrofemorata* are synonyms of *A. cincta* according to some authors (Brunetti, 1920; Edwards, 1932; Henning, 1955; Tuomikoski, 1966; Colless & Leipa, 1973), but Zaitsev (1981) differs the three species. Two additional species are being described by Amorim et al. (preprint) from Singapore. Söli (2017) noted additional specimens from Burundi, Democratic Republic of the Congo and Tanzania with unclear systematic position. The genus has been recorded from the Afrotropical, Oriental, Australasian/Oceanian and Palaearctic Regions. We consider as doubtful the belonging of the single

described fossil species, *A. veiti* Theobald, 1937 to the genus. The aim of this contribution is to present new data on the taxonomy and distribution of some species of the genus.

Material and methods

This contribution is based on the study of type specimens of *A. argentosquamosa*, one specimen of *A. formosana* from Naturalis Biodiversity Center – Amsterdam, and three specimens of *Allactoneura* collected by Dr Ignac Sivec, Mr Jacobs and Mr Chantaramongkol from SE Asia, deposited in Regional Natural History Museum of Plovdiv – Bulgaria. Also, information from literature and web sources was analysed.

The terminalia of the studied specimens were removed and subsequently macerated in 10% warm KOH. Dissections and temporary slides were made in glycerol. The slides were photographed by digital camera Canon EOS 750D fit to the compound microscope (camera with 24×36 mm film for Fig. 6). The

terminalia were afterwards transferred to microvial with glycerine and stored together with the specimen.

Results

Genus *Allactoneura* De Meijere, 1907

Allactoneura De Meijere, 1907: 201. Type species: *Allactoneura cincta* De Meijere, by monotypy.

Scottella Enderlein, 1910: 60. Type species: *Scottella argentosquamosa* Enderlein, original designation. Synonymy: De Meijere (1913).

Allactoneura argentosquamosa (Enderlein, 1910)
(Figs 1–3)

Scottella argentosquamosa Enderlein, 1910: 61, Figs 1–2: wing. Type locality: Seychelles: Silhouette, Mahé (“Seychelen: Silhouette, Mahé”). Types: 14 ♂♂ and 37 ♀♀, National History Museum London and Museum of Zoology, Cambridge University, United Kingdom (in London, Stettin and Cambridge according to the original description).

Note. The synonymy of *Scottella argentosquamosa* with *Allactoneura cincta* De Meijere (Edwards, 1913a) is incorrect (see Edwards, 1928).

Male genitalia: Natural History Museum – London, Data Portal, #BMNHE254380; Oliveira & Amorim (2021: Figs 78–79).

Type material examined

In 1993 D. Bechev investigated the following specimens from the Zoological Museum Amsterdam (now Naturalis Biodiversity Center):

- 1 ♂: with labels: “Mahe, ’08-9., Seychelles Exp.”, “taken in coitu 13.09”, “*Scottella argentosquamosa* Enderl. Type”. The specimen was designated/labeled as: “*Allactoneura argentosquamosa* (Enderlein, 1910), Lectotype, des. D. Bechev, 1993”, but not published,
- 1 ♀: with same labels. The specimen was designated/labeled as: “*Allactoneura argentosquamosa* (Enderlein, 1910), Paralectotype, des. D. Bechev, 1993”, but not published,
- 1 ♂: with labels: “Mahe, ’08-9., Seychelles Exp.”, “*Scottella argentosquamosa* Enderl. Type, det.

Dr. Enderlein”. The specimen was designated/labeled as: “*Allactoneura argentosquamosa* (Enderlein, 1910), Paralectotype, des. D. Bechev, 1993”, but not published,

- 1 ♀: with labels: “Mahe, ’08-9., Seychelles Exp.”, “*Scottella argentosquamosa* Enderl. Type, det. Dr. Enderlein”. The specimen was designated/labeled as: “*Allactoneura argentosquamosa* (Enderlein, 1910), Paralectotype, des. D. Bechev, 1993”, but not published,
- 2 ♀: with labels: “Silhouette, ’08, Seychelles Exp.”, “*Scottella argentosquamosa* Enderl. det. Dr. Enderlein”. The specimens were designated/labeled as: “*Allactoneura argentosquamosa* (Enderlein, 1910), Paralectotype, des. D. Bechev, 1993”, but not published.

In the collection of the Natural History Museum – London (Data Portal) other type specimens are presented, too:

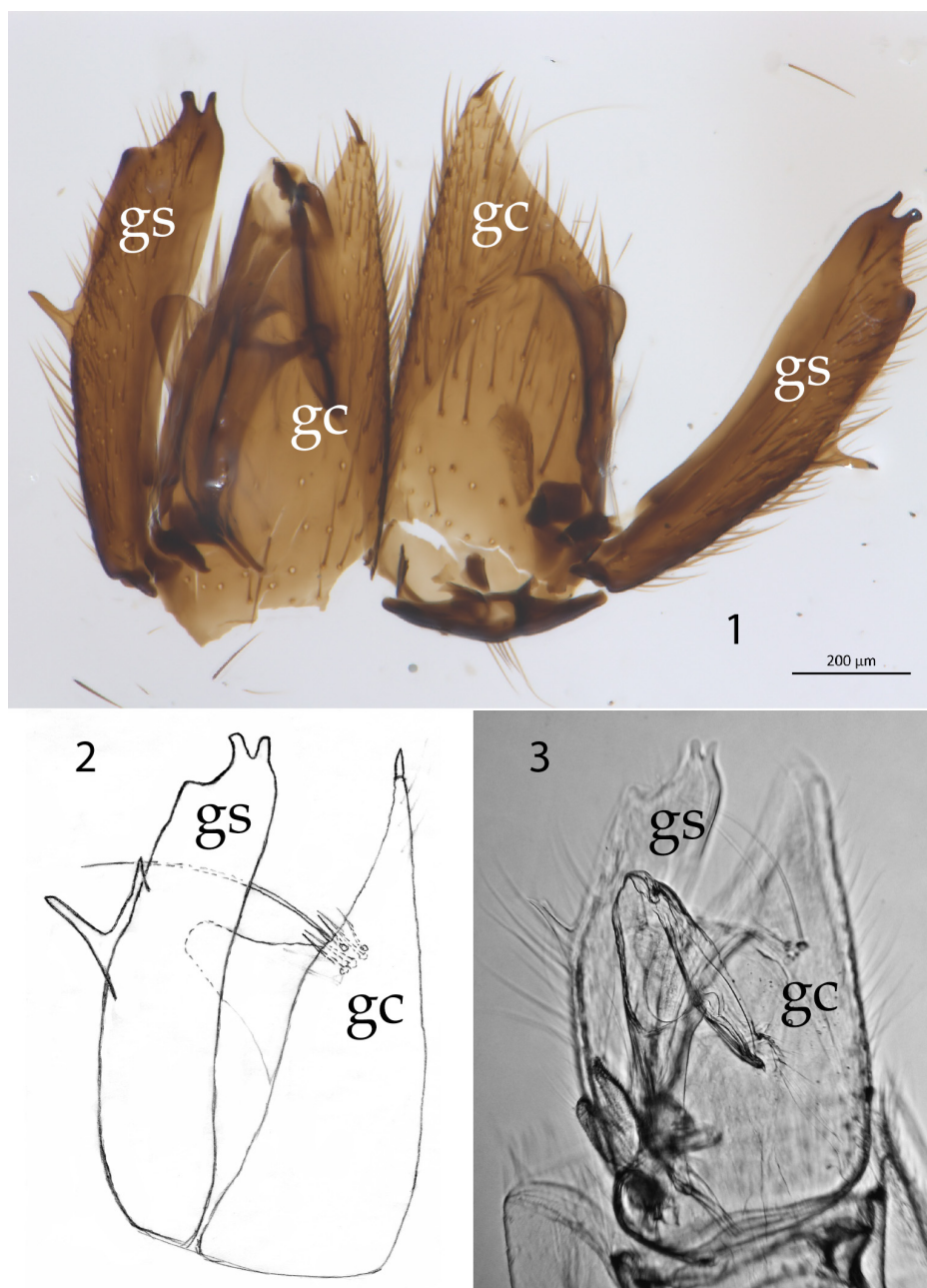
- lectotype (#BMNHE254380), without locality data, with photos of head, thorax, wing and male genitalia,
- 10 syntypes (#BMNH(E)254381–BMNH(E)254390) from Seychelles.

We believe that in a future revision of the type specimens it is necessary to reliably label, describe and publish lectotype and paralectotypes, selected from the types.

Other material examined: Sumatra: Fort de Kock, 920m, 1925, leg E. Jacobson, 1 ♂ (Fig. 2), in Zoological Museum Amsterdam (now Naturalis Biodiversity Center); Thailand: Chiangmai, Zoo, 400 m, 98° 57' E, 18° 48' N, 21-28.05.1988, Leg. Chantaramongkol, 1 ♂ (Fig. 3), (in Regional Natural History Museum – Plovdiv, Bulgaria).

Distribution (Fig. 7): Afrotropical region: Seychelles (Enderlein, 1910, current article), Madagascar (Stuckenberg, 1961; Oliveira & Amorim, 2021), Mauritius (Oliveira & Amorim, 2021), Diego Garcia Island (Hutson, 1981); Oriental Region: Indian Subcontinent: India: Assam (Edwards, 1928); Industan Islands: Sri Lanka (Edwards, 1928); Indo-China: Thailand (current article); Malesia: Indonesia: Sumatra (current article).

Note. Tuomikoski (1966) and Colless & Liepa (1973) noted the presence of *A. argentosquamosa* also in Tanzania (Tanganayika), Mauritius, Thailand and Malaya, but did not provide specimen information in either of the articles.



Figs 1–3. *A. argentosquamosa*, male genitalia, lateral view: 1 – BMNH Catalogue number: BMNHE254380), Type status: Lectotype; available at: <https://data.nhm.ac.uk/dataset/56e711e6-c847-4f99-915a-6894bb5c5dea/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/8064230>; 2 – specimen from Sumatra: Fort de Kock, pencil drawing; 3 – specimen from Thailand: Chiangmai. Abbreviations: gc = gonocoxite; gs = gonostylus.

Allactoneura akasakana Sasakawa, 2005 (Fig. 4)

Allactoneura akasakana Sasakawa, 2005: 278. Type locality: Akasaka Imperial Garden, Tokyo, Japan. Holotype male.

Male genitalia: Sasakawa (2005: Figs 6–8), Sueyoshi et al. (2019: Fig. 3).

Note: Male genitalia are like these of *A. argentosquamosa*. Probable synonym of *A. argentosquamosa*.

Larva: Sueyoshi et al. (2019).

Distribution (Fig. 7): Palaearctic: Japan: Tokyo (Sasakawa, 2005), Honshu (Sueyoshi et al., 2019). Oriental Region: China Southeast, Zhejiang

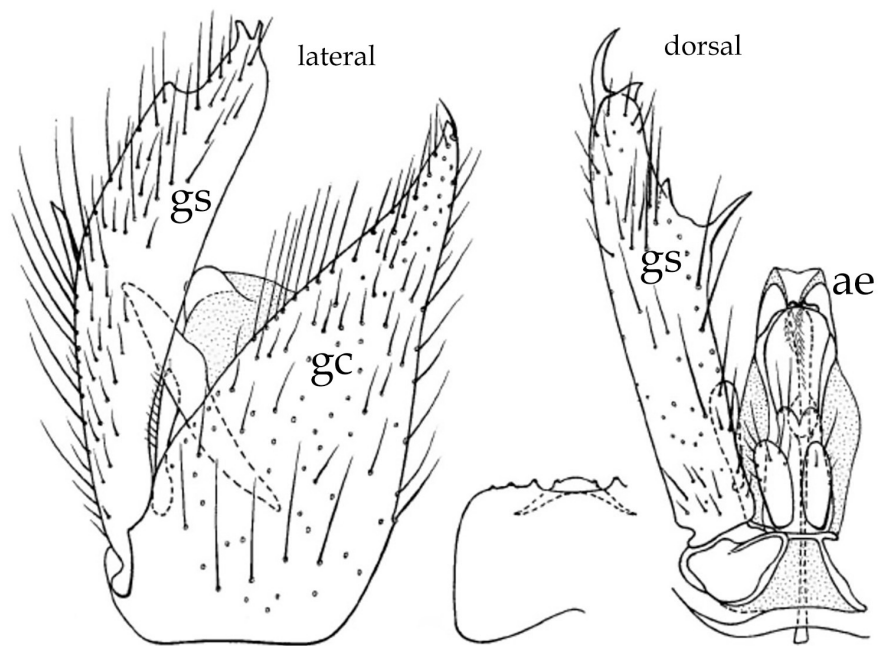
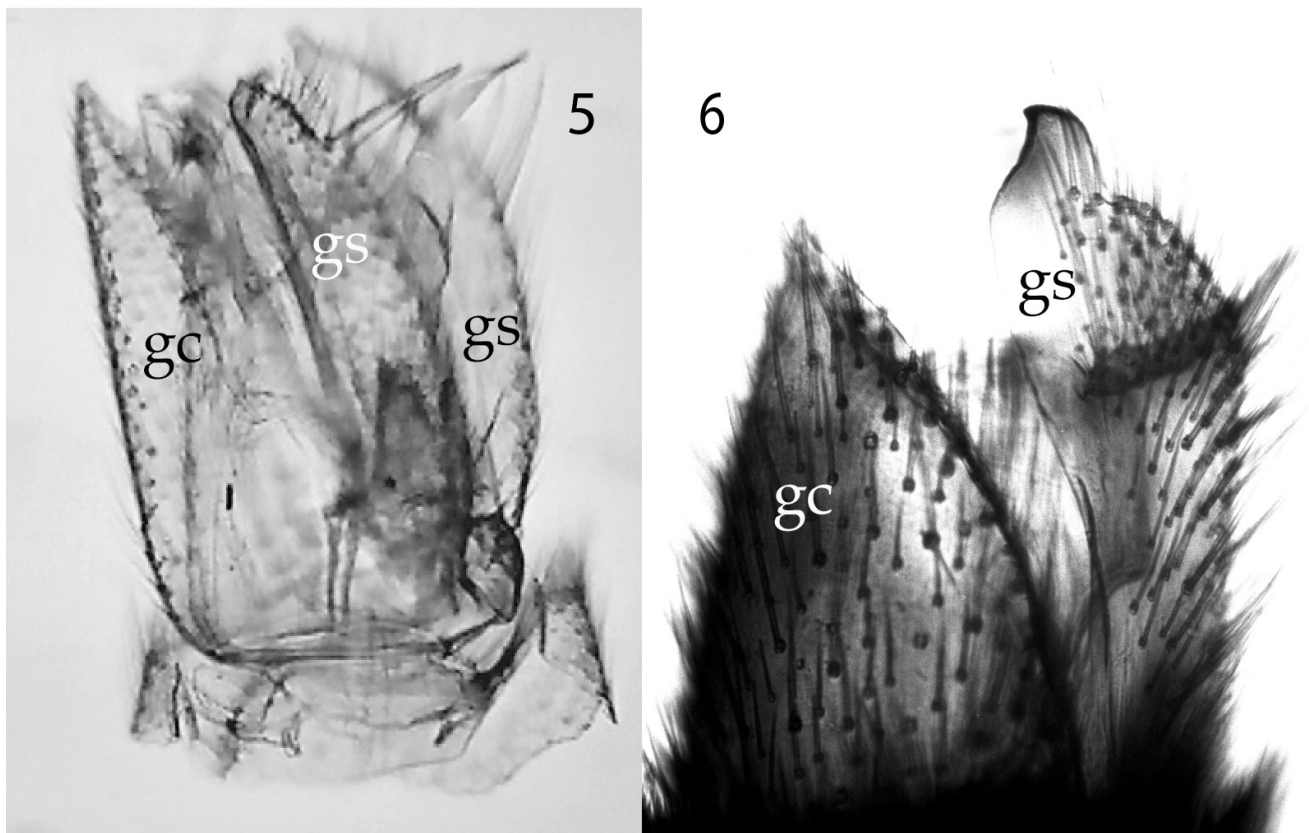


Fig. 4. *A. akasakana*, male genitalia, lateral and dorsal view (from Sasakawa, 2005). Abbreviations: ae = aedeagus; gc = gonocoxite; gs = gonostylus.



Figs 5–6. Male genitalia, lateral view: 5 – *A. cincta*, specimen from Indonesia: N. Sumatra; 6 – *A. formosana*, specimen from Fort de Kock (Sumatra). Abbreviations: gc = gonocoxite; gs = gonostylus.

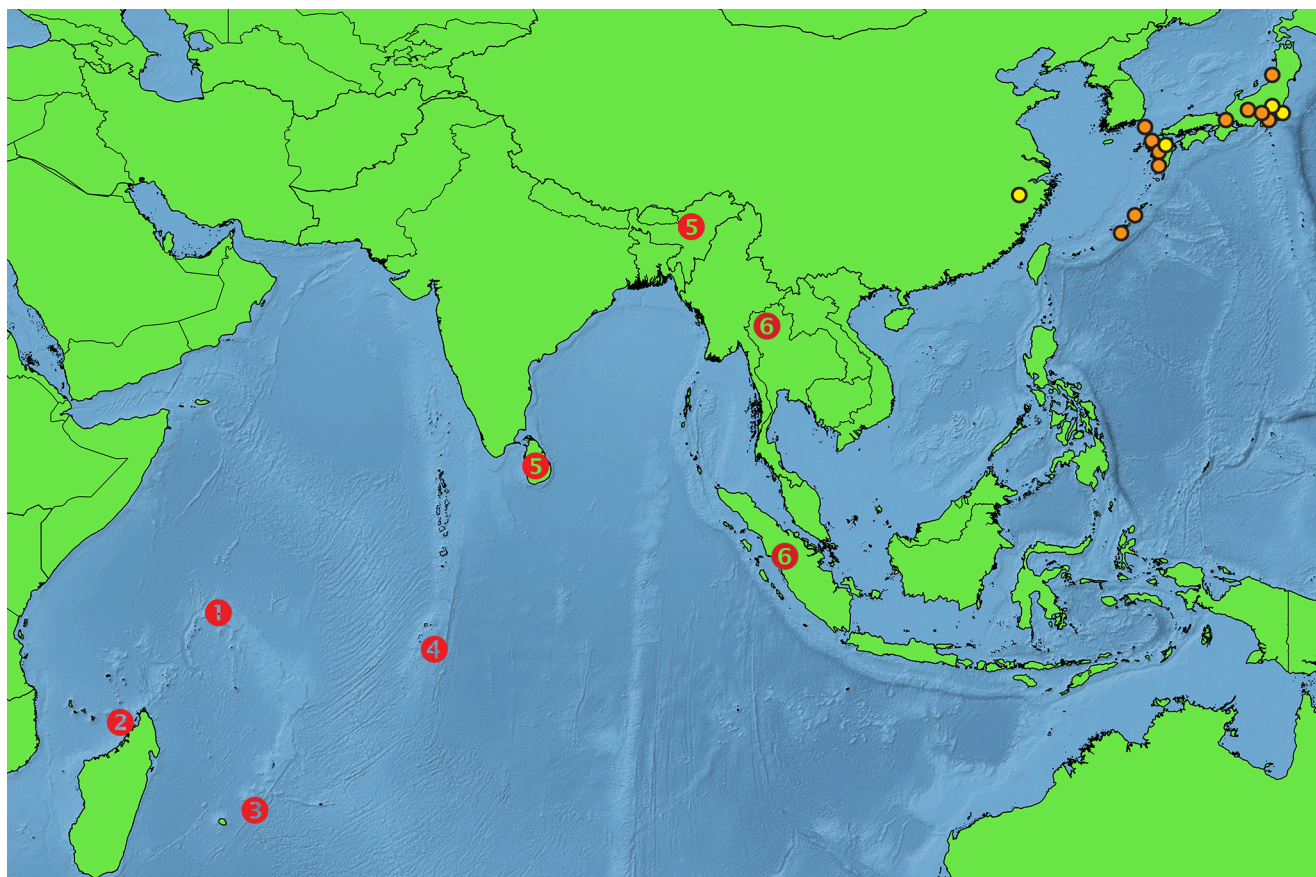


Fig. 7. Known distribution of *A. argentosquamosa* and *A. akasakana*. Legend. 1–6: *A. argentosquamosa*: 1 – Enderlein (1910), 2 – Stuckenberg (1961) and Oliveira & Amorim (2021), 3 – Oliveira & Amorim (2021), 4 – Hutson (1981), 5 – Edwards (1928), 6 – new data in current article; *A. akasakana*: orange circle – outdoor locality, yellow circle – indoor facility of shiitake mushrooms (Sueyoshi et al., 2019).

(Sueyoshi et al., 2019); Japan: Okinawa (Sueyoshi et al., 2019).

Allactoneura cincta De Meijere, 1907

Allactoneura cincta De Meijere, 1907: 202, pl. 5 Figs 2–3. Type locality: Bogor, Jawa. Holotype male.

Male and female genitalia: Zaitsev (1981, Fig. 2).

Material examined: Indonesia: N. Sumatra, W Pematang Siantar, 750 m, 23.02.1994, Leg Sivec, I., 1 ♂ (Fig. 5), (in Regional Natural History Museum – Plovdiv, Bulgaria).

Distribution: Oriental Region: Nepal (Brunetti, 1912, 1920); India (Brunetti, 1913, 1920; Senior-White, 1922; Oliveira & Amorim, 2021), Sri Lanka (Brunetti, 1912, 1920; Edwards, 1913b); Bangladesh (Brunetti, 1912, 1913, 1920; Senior-White, 1922); China Southeast: Guangdong (Hoffmann, 1938),

Taiwan (Brunetti, 1920; Senior-White, 1922); Malaysia: Sabah (Edwards, 1931, 1933); Philippines (Edwards, 1929); Indonesia: Jawa (De Meijere, 1907, 1913, 1924a, b; Brunetti, 1912, 1913, 1920; Edwards, 1928); Siberut Island (Edwards, 1932), Krakatau (Edwards, 1927; Zaitsev, 1981); Sumatra (current article).

Allactoneura formosana (Enderlein, 1910)

Scottella formosana Enderlein, 1910: 63. Type locality: “Formosa” (= Taiwan, China). Type female, probably lost.

Allactoneura formosana (Enderlein, 1910): Brunetti (1920), Zaitsev (1981).

Male genitalia: Zaitsev (1981, Figs 3.1, 3.2).

Note: *Allactoneura formosana* is included in Brunetti (1920) and subsequently in Colless & Liepa

(1973) as synonym of *A. cincta*, but Zaitsev (1981) distinguishes these species.

Material examined: 1 ♂, Fort de Kock (Sumatra), 920 m, 1925, leg E. Jacobs (Fig. 6), (in Zoological Museum Amsterdam, now Naturalis Biodiversity Center).

Discussion. Based on the examined specimen and Zaitsev's study, we consider that *A. formosana* is a valid species.

Distribution: China Southeast: Taiwan (Enderlein, 1910); Indonesia: Jawa (De Meijere, 1913; Zaitsev, 1981), Sumatra (current article).

Discussion

The male genitalia of *A. akasakana* are like those of *A. argentosquamosa* (Figs 1–4) and it is possible that the two species are identical. To clarify this question, it is necessary to compare them in detail. In the case that *A. akasakana* is a synonym of *A. argentosquamosa*, a widespread distribution of *A. argentosquamosa* (see Fig. 7) is likely due to anthropogenic spread along maritime trade routes across the Indian Ocean. The discovery of *A. akasakana* larvae in indoor facilities of the shiitake mushroom, *Lentinula edodes* (Berk.) Pegler in Japan and China (Sueyoshi et al., 2019) and the finding of *Allactoneura* sp. larvae on rotting wood (<https://dipteraandfungi.blogspot.com/search?q=Allactoneura>) is in support of this possibility.

Acknowledgements

This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme “Young scientists and postdoctoral fellows – 2” approved by DCM 206/07.04.2022. The authors are also grateful for the helpful comments and suggestions given by Sarah Oliveira and Jozef Oboňa.

References

Amorim D.D.S., Oliveira S.S., Balbi M.I.P.A., Ang Yu., Yeo D., Srivathsan A., Meier R. [preprint] An integrative taxonomic treatment of the

Mycetophilidae (Diptera: Bibionomorpha) from Singapore reveals 115 new species on 730km². *bioRxiv* 2023.09.02.555672.

<https://doi.org/10.1101/2023.09.02.555672>

Brunetti E. 1912 The Fauna of British India Including Ceylon and Burma: Diptera Nematocera (Excluding Culicidae and Chironomidae). Taylor and Francis, London, Vol. 1, xxviii + 581 pp.

Brunetti E. 1913 Zoological Results of the Abor Expedition 1911-12. XI. Diptera. Records of the Indian Museum 8: 149–190.

<https://doi.org/10.26515/rzsi/v8/i2/1913/163167>

[10.26515/rzsi/v8/i2/1913/163167](https://doi.org/10.26515/rzsi/v8/i2/1913/163167)

Brunetti E. 1920 Catalogue of Oriental and South Asiatic Nematocera. Records of the Indian Museum 17: 1–300.

<https://doi.org/10.26515/rzsi/v17/i1/1920/162777>

[10.26515/rzsi/v17/i1/1920/162777](https://doi.org/10.26515/rzsi/v17/i1/1920/162777)

Colless D.H., Liepa Z. 1973 Superfamily Mycetophiloidea, family Mycetophilidae. In: Delfinado M.D., Hardy D.E. (eds) A catalog of the Diptera of the Oriental Region. Vol. 1. 1–618. The University Press of Hawaii, Honolulu, 444–463.

De Meijere J.C.H. 1907 Studien über südostasiatische Dipteren. I. Tijdschrift voor Entomologie 50: 196–264, 2 taf.

De Meijere J.C.H. 1913 Studien über südostasiatische Dipteren. VII. Tijdschrift voor Entomologie 56: 317–354, 3 pl.

De Meijere J.C.H. 1924a Studien über südostasiatische Dipteren. XV. Tijdschrift voor Entomologie, Supplement 67: 1–64, 10 fig.

De Meijere J.C.H. 1924b Studien über südostasiatische Dipteren. XVI. Tijdschrift voor Entomologie 67: 197–224.

Edwards F.W. 1913a III.–Some Mycetophilid Synonymy (Diptera). Annals and Magazine of Natural History (8) 12: 55–56.

<https://doi.org/10.1080/00222931308693365>

Edwards F.W. 1913b XXII.–New and little-known Diptera Nematocera from Ceylon. Annals and Magazine of Natural History (8) 12: 199–204.

<https://doi.org/10.1080/00222931308693386>

Edwards F.W. 1927 Diptera Nematocera from the Dutch East Indies. *Treubia* 9: 352–370.

Edwards F.W. 1928 Diptera Nematocera from the Federated Malay States Museum. *Journal of the Federated Malay States Museum* 14: 1–139, 2 pl.

Edwards F.W. 1929 Philippine Nematoceros Diptera. III. *Notulae entomologicae* 9: 70–81.

- Edwards F.W. 1931 Diptera Nematocera from the lowlands of North Borneo. *Journal of the Federated Malay States Museum* 16: 486–504.
- Edwards F.W. 1932 Spolia Mentawiensia: Diptera Nematocera. *Bulletin of the Raffles Museum* 74–79.
- Edwards F.W. 1933 Diptera Nematocera from Mount Kinabalu. *Journal of the Federated Malay States Museum* 17: 223–296, 1 pl.
- Enderlein G. 1910 The Percy Sladen Trust Expedition to the Indian Ocean in 1905. V. Diptera, Mycetophilidae. *Transactions of the Linnean Society of London* 2 (14): 59–81.
- Henning W. 1955 Das Flügelgeäder der Gattung *Allactoneura*. *Beiträge zur Entomologie* 5 (1/2): 127–128.
- Hoffmann W. 1938 Distributional and Biological notes on some Kwangtung Diptera. *Lingnan Science Journal* 17 (2): 251–259.
- Hutson A.M. 1981 A preliminary list of insects of Diego Garcia Atoll, Chagos Archipelago. *Atoll Research Bulletin* 243: 149–190.
- Oliveira S.S., Amorim D.D.S. 2021 Phylogeny, Classification, Mesozoic Fossils, and Biogeography of the Leiinae (Diptera: Mycetophilidae). *Bulletin of the American Museum of Natural History* 446: 1–108.
<https://doi.org/10.1206/0003-0090.446.1.1>
- Sasakawa M. 2005 Fungus Gnats, Lauxaniid and Agromyzid Flies (Diptera) of the Imperial Palace, the Akasaka Imperial Gardens and the Tokiwamatsu Imperial Villa, Tokyo. *Memoirs of the National Science Museum Tokyo*, 273–312.
- Senior-White R.A. 1922 Notes on Indian Diptera. *Memoirs of the Department of Agriculture in India. Entomological series* 7: 83–169, 5 pl., 2 fig.
- Stuckenberg B. 1961 Records and descriptions of Diptera from Madagascar. Part I. Anisopodidae, and Mycetophilidae genus *Allactoneura* De Meijere. *Naturaliste malgache* 12 (1960): 121–132.
- Sueyoshi M., Mukai H., Kitajima H., Huang J. 2019 *Allactoneura akasakana* Sasakawa, 2005 (Diptera, Mycetophilidae), occurred in cultivation facilities of shiitake mushroom. *Bulletin of the Forestry and Forest Products Research Institute* 18: 319–324.
- Théobald N. 1937 Les insectes fossiles des terrains Oligocènes de France. *Imprimerie Georges Thomas, Nancy, Vol. 2, 437 pp.*
- Tuomikoski R. 1966 On the subfamily Manotinae (Dipt., Mycetophilidae). *Annales Entomologici Fennici* 32 (2): 211–223.
- Zaitsev A.I. 1981 Composition and systematic position of the genus *Allactoneura* De Meijere (Diptera, Mycetophilidae). *Review d'Entomologie de l'USSR* 60: 901–913. (In Russian)